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Transmitted herewith for filing under 35 U.S.C. 111 and 37. C.F.R. 1.53 is the patent application of:

INVENTOR(S): SCOTT BRUNK

FOR: GPS RECEIVER AND DEPTH SOUNDER UNIT HAVING AN ADJUSTABLE DISPLAY SCREEN

Enclosed are:

- ☒ Certificate of Mailing with Express Mail Mailing Label No. EL541128963US
- ☒ 3 sheets of drawing(s)
- ☒ Combined Declaration and Power of Attorney
- ☒ An Assignment of the invention to GARMIN CORPORATION together with the recording fee of \$40.00.
- ☐ A verified statement to establish small entity status under 37 CFR 1.9 and 37 CFR 1.27.
- ☒ Information Disclosure Statement

The filing fee has been calculated as shown below:

	(Col. 1)	(Col. 2)
FOR:	NO. FILED	NO. EXTRA
BASIC FEE		
TOTAL CLAIMS	11-20=	* 0
INDEP. CLAIMS	3-3=	* 0
MULTIPLE DEPENDENT CLAIM PRESENT		

\*If the difference in col. 1 is less than zero, enter "0" in Col. 2

SMALL ENTITY	
RATE	FEE
	\$ 345 00
x 9	
x 39	
+130	
TOTAL	\$

OTHER THAN A SMALL ENTITY	
RATE	FEE
	\$ 690 00
x 18	
x 78	
+260	
TOTAL	\$690.00

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- ☒ Any patent application processing fees under 37 CFR 1.16.
- ☐ The issue fee set in 37 CFR 1.18 at or before the mailing of the Notice of Allowance, pursuant to 37 CFR 1.311(f).
- ☒ Any fees under 37 CFR 1.16 for presentation of extra claims.

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# GPS RECEIVER AND DEPTH SOUNDER UNIT HAVING AN ADJUSTABLE DISPLAY SCREEN

5

## BACKGROUND OF THE INVENTION

### 1. FIELD OF THE INVENTION

The present invention relates to navigational devices. More particularly,  
the invention relates to a combined GPS receiver and depth sounder unit that includes  
10 a single display screen that can be smoothly adjusted so that the area of the display  
screen devoted to a GPS map can be changed relative to the area devoted to a depth  
sounder display.

### 2. DESCRIPTION OF THE PRIOR ART

15 Many types of navigational devices exist for both recreational and  
professional use. For example, many fishermen, boaters, and other sportsmen use  
GPS receivers to determine and view their current location and depth sounders to  
determine the depth of a body of water.

20 Recently, GPS receivers and depth sounders have been combined in  
single units to permit users to determine both their current location and the depth of a  
body of water. These combined units typically include a single display screen that  
displays both a GPS map display and a depth sounder display.

25 Combined GPS receivers and depth sounder units allocate a fixed amount  
of their display screens for the GPS map display and the depth sounder display, for  
example, approximately 75% for the GPS map and approximately 25% for the depth  
sounder display. This fixed division of the display screen is a limitation because users  
may wish to adjust the relative size of the GPS map and depth sounder displays in  
certain circumstances. For example, a fisherman who is primarily interested in  
determining and viewing the depth of a body of water may wish to enlarge the depth  
30 sounder display relative to the GPS map display to provide more resolution for the depth  
display.

## OBJECTS AND SUMMARY OF THE INVENTION

The present invention solves the above-described problems and provides a distinct advance in the art of navigational devices. More particularly, the present invention provides a navigational device with a single display screen that simultaneously  
5 displays two different sets of information and that permits an operator to selectively adjust the portion of the display screen that is devoted to each of the sets of information.

In one preferred embodiment, the navigational device is a combined GPS receiver and depth sounder unit that includes a first input port for receiving a sensor signal from a depth sounder transducer; a second input port for receiving a location  
10 signal; a display screen including a first display area for displaying information corresponding to the sensor signal and a second display area for displaying information corresponding to the location signal; and a computing device coupled with the display screen. The computing device is programmed to permit a viewer to selectively adjust the size of the first and second display areas relative to one another to change the  
15 relative portion of the display screen that is occupied by the first and second display areas. This display adjustment is smooth (i.e., finely adjustable) so that a viewer can select any number of different sizes for the first and second display areas within the limits of the overall size of the display screen and the resolution of the screen.

These and other important aspects of the present invention are described  
20 more fully in the detailed description below.

## BRIEF DESCRIPTION OF THE DRAWING FIGURES

A preferred embodiment of the present invention is described in detail below with reference to the attached drawing figures, wherein:

25 Fig. 1 is an elevational view of a GPS receiver and depth sounder unit constructed in accordance with a preferred embodiment of the present invention and shown connected to a depth sounder transducer and an antenna.

Fig. 2 is a block diagram depicting several of the components of the combined GPS receiver and depth sounder unit of Fig. 1.

30 Fig. 3 is a screen display showing the simultaneous display of a GPS map display and a depth sounder display on the unit.

Fig. 4 is a screen display illustrating a first step in the method of resizing the GPS map display and the depth sounder display.

Fig. 5 is a screen display illustrating a second step in the method of resizing the GPS map display and the depth sounder display.

Fig. 6 is a screen display illustrating a third step in the method of resizing the GPS map display and the depth sounder display.

5 Fig. 7 is a screen display illustrating a fourth step in the method of resizing the GPS map display and the depth sounder display.

Fig. 8 is a flow diagram illustrating certain steps performed by a computer program that is used to resize the displays.

## 10 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Turning now to the drawing figures, and particularly Figs. 1 and 2, a combined GPS receiver and depth sounder unit 10 constructed in accordance with a preferred embodiment of the invention is illustrated. The unit is operable for determining and displaying both GPS location information and depth information for a body of water and broadly includes a computing device 12, a display screen 14, one or more input devices 16, and memory 18 all housed in or on an outer housing 20.

15 In more detail, the computing device 12 is provided for controlling operation of the other components of the unit as described herein in response to information received from external sensors and antennas. In one preferred embodiment, the computing device 12 is coupled with a first input port 22 that in turn may be coupled with a sonic-type depth transducer 24. The depth transducer generates sensor signals representative of the depth of a body of water and transmits the signals to the computing device 12. The computing device 12 analyzes the sensor signals and, together with other conventional electronics in the unit 10, displays information on the display screen 14 relating to the sensor signals.

20 The computing device 12 is also preferably coupled with a second input port 26 that in turn may be coupled with an antenna 28. The antenna receives location signals such as GPS signals representative of the location of the unit from GPS satellites and delivers the signals to the computing device 12. The computing device 12 analyzes the location signals and, together with other conventional electronics in the unit 10, displays information on the display screen 14 relating to the location signals.

25 The display screen 14 is coupled with the computing device 12 for displaying information relating to the signals received from the transducer 24 and the

antenna 28. In one preferred embodiment of the invention, the display screen simultaneously displays a depth sounder display in a first area 30 of the display screen and a GPS map in a second area 32 of the display screen. In another embodiment, the unit 10 may be dedicated to depth sounder capabilities only and display a regular sized  
5 depth sounder display in the first display area 30 and an enlarged or zoomed depth sounder display in the second display area 32. The display is preferably a liquid crystal display (LCD).

The input devices 16 are coupled with the computing device 12 and are provided for operating the unit 10 in a conventional manner and for permitting an  
10 operator to adjust the size of the first and second display areas 30, 32 of the display screen 14 as described in more detail below. The input devices 16 preferably include an Enter key 34, a Menu key 36, a Scrolling key 38, a Quit or Escape key 39, and several other keys found on conventional GPS receiver and depth sounder units such as the GPS 162 unit mentioned above.

In accordance with one important aspect of the present invention, the computing device 12 is programmed to permit a viewer to selectively and smoothly adjust the relative size of the first and second display areas 30, 32 of the display  
15 screen 14 to any number of different sizes within the limits of the overall size and resolution of the display screen. For example, a user may wish to enlarge the depth sounder display relative to the GPS map display to improve the detail and/or resolution of the depth sounder display. The computer program that performs this function may be implemented in firmware or stored in memory 40 accessible by the computing device. The computer program is preferably written in C, but may be written in any computer  
20 language as a matter of design choice.

A user first initiates the screen adjustment feature of the present invention by pressing the Menu key 36 on the front of the unit 10. The computing device 12 then displays a menu box 42 over the GPS map and the depth sounder display as depicted in Fig. 4. The user may then select to resize the map by selecting this option from the menu.  
25

When the user selects the Resize Map option, a cursor 44 and bold line 46 are displayed over the boundary between the first and second display areas 30, 32 as depicted in Fig. 5. The user may then adjust the relative size of the two display areas by pressing either the left or right arrow on the Scrolling key 38. For example, if the user  
30

wishes to increase the size of the depth sounder display relative to the GPS map display, the user would push the left arrow on the Scrolling key 38. This causes the cursor 44 and bold line 46 to move to the left as illustrated in Fig. 6. Once the user has moved the cursor 44 and bold line 46 to a preferred location, the computing device 12

5 reallocates the portion of the display screen 14 that is devoted to the first and second display areas 30, 32 as depicted in Fig. 7 and resizes the GPS map and depth sounder display to fit their respective display areas.

Fig. 8 is a flow diagram depicting the steps performed by the computer program during the screen display resizing process described above. The screen

10 resizing portion of the computer program begins when a user initiates the resizing function as depicted in step 800. The computer program then waits for the user to press the Scrolling key 38 as depicted in step 802 and continues to loop through step 802 until the key is pushed.

The computer program next determines whether the left or right cursor 44

15 on the Scrolling key 38 is pressed as depicted in step 804. If the left cursor is pressed, the program determines whether a left adjustment limit has been reached in step 806. The adjustment limits are preprogrammed size limits for the two display areas 30, 32. For example, in one preferred embodiment of the invention, the second display area 32 devoted to the GPS map display occupies at least 50%, but no more than 75%, of the

20 display screen. Conversely, the first display area 30 devoted to the depth sounder display occupies at least 25%, but no more than 50% of the display screen.

If an adjustment limit has been reached in step 806, the computer program causes the unit 10 to generate an error tone or signal as depicted in step 808. However, if an adjustment limit has not been reached, the computer program moves the boundary

25 or divider between the two display areas 30, 32 to the left as depicted in step 808 and then returns to step 802 to wait for further screen adjustments.

If the user presses the right cursor in step 804, steps 812, 814, and 816 perform the same functions as steps 806, 808, and 810, except that the divider or boundary is moved to the right.

30 Once the user stops moving the cursor to the left or right, step 818 of the computer program waits for the user to either press the Enter key 34 or the Escape key 39. If the user presses the Escape key, the computer program restores the screen division to the previous location and then resumes normal operation. However, if the

user presses the Enter key, the computer program resizes the display screen according to the new position of the divider or boundary as depicted in step 822.

From the foregoing description of a preferred embodiment of the present invention, one skilled in the art will appreciate that the present invention offers an advance in the art of navigational devices by providing such a device with a single display screen that simultaneously displays two different sets of information and that permits an operator to selectively adjust the portion of the display screen that is devoted to each of the sets of information. The navigational device of the present invention permits a smooth adjustment of the display areas of the display screen so that an operator may adjust the sizes of the display areas limited only by the overall size and resolution of the display screen.

Although the invention has been described with reference to the preferred embodiment illustrated in the attached drawing figures, it is noted that equivalents may be employed and substitutions made herein without departing from the scope of the invention as recited in the claims. For example, although the preferred embodiment of the present invention is implemented on a combined GPS receiver and depth sounder unit, it may be used with other navigational devices including a dedicated depth sounder unit that includes a display screen having a first display area for a regularly sized depth sounder display and a second display area for an enlarged or zoomed depth sounder display.

Having thus described the preferred embodiment of the invention, what is claimed as new and desired to be protected by Letters Patent includes the following:

CLAIMS:

1. A navigational device comprising:  
a first input port for receiving a sensor signal from a sensor, the sensor signal  
being representative of a sensed condition;  
5 a second input port for receiving a location signal, the location signal being  
representative of a location of the navigational device;  
a display screen including a first display area for displaying information  
corresponding to the sensed condition and a second display area for  
displaying information corresponding to the location signal; and  
10 a computing device coupled with the display screen, the computing device being  
operable to permit a viewer to selectively adjust a size of the first and  
second display areas to change the relative portion of the display screen  
that is occupied by the first and second display areas.

15 2. The navigational device as set forth in claim 1, the computing device  
being operable to permit the viewer to smoothly adjust the size of the first and second  
display areas to a number of different sizes.

20 3. The navigational device as set forth in claim 1, the sensor including a  
sonic transducer, the sensed condition including depth of a body of water.

4. The navigational device as set forth in claim 3, the information  
corresponding to the sensed condition including a depth display.

25 5. The navigational device as set forth in claim 1, the location signal  
including a GPS signal.

6. The navigational device as set forth in claim 5, the information  
corresponding to the location signal including a GPS map.

30



7. A navigational device comprising:  
an input port for receiving a sensor signal from a sensor, the sensor signal being  
representative of a sensed condition;

5 a display screen including a first display area for displaying a first set of  
information corresponding to the sensed condition and a second display  
area for displaying a second set of information corresponding to the  
sensed condition; and

10 a computing device coupled with the display screen, the computing device being  
operable to permit a viewer to selectively adjust a size of the first and  
second display areas to change the relative portion of the display screen  
that is occupied by the first and second display areas.

8. The navigational device as set forth in claim 7, the computing device  
being operable to permit the viewer to smoothly adjust the size of the first and second  
15 display areas to a number of different sizes.

9. The navigational device as set forth in claim 7, the sensor including a  
sonic transducer, the sensed condition including depth of a body of water.

20 10. The navigational device as set forth in claim 9, the first set of  
information including a depth display and the second set of information including an  
enlarged depth display.

11.

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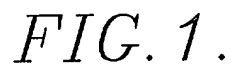
adjusting the size of the first and second display areas in response to the request to change the relative portion of the display screen that is occupied by the first and second display areas; and

10

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[illegible]

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380	2381	2382	2383	2384	2385	2386	2387	2388	2389	2390	2391	2392	2393	2394	2395	2396	2397	2398	2399	2400	2401	2402	2403	2404	2405	2406	2407	2408	2409	2410	2411	2412	2413	2414	2415	2416	2417	2418	2419	2420	2421	2422	2
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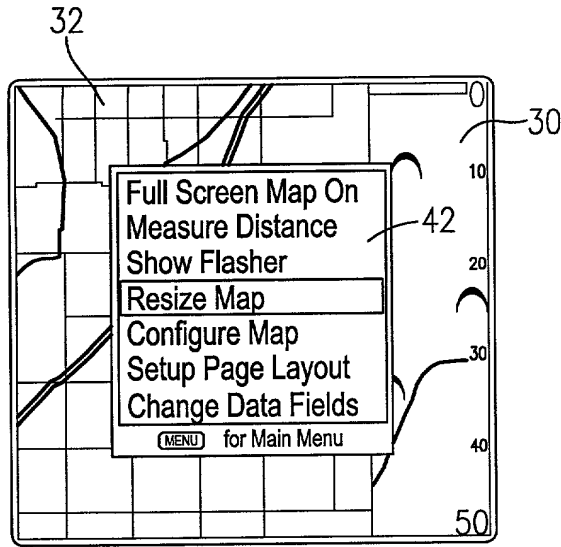


FIG. 4.

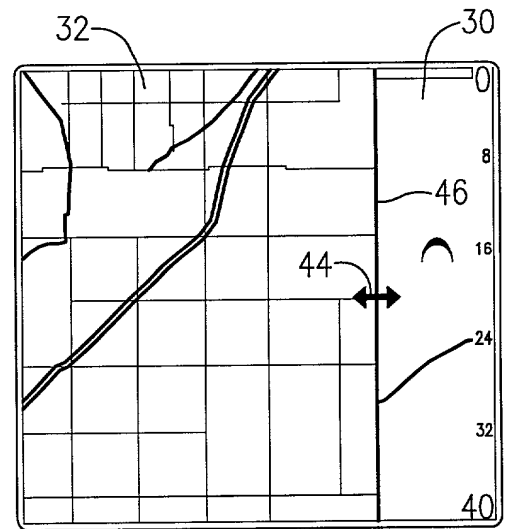


FIG. 5.

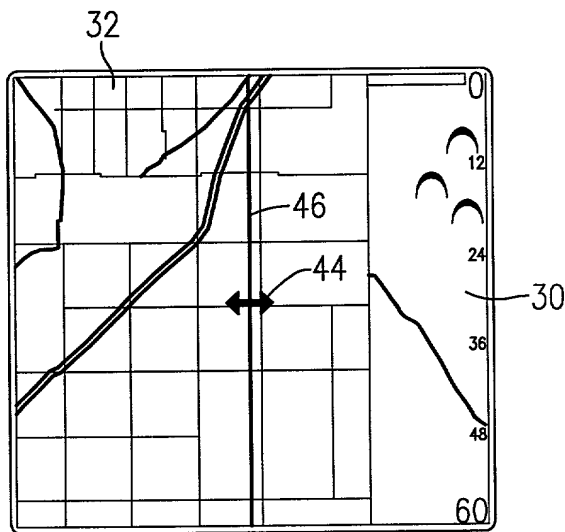


FIG. 6.

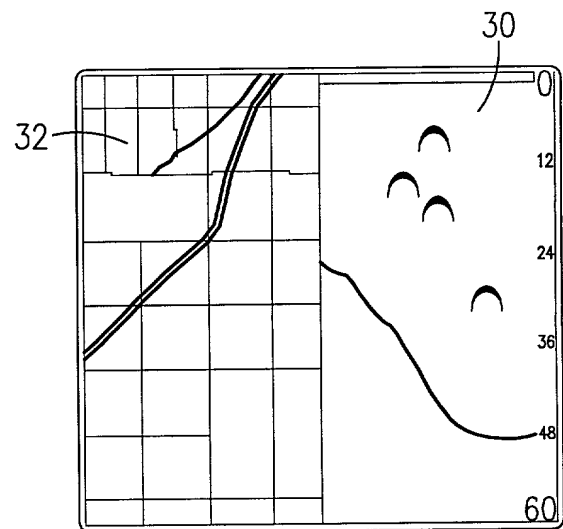


FIG. 7.

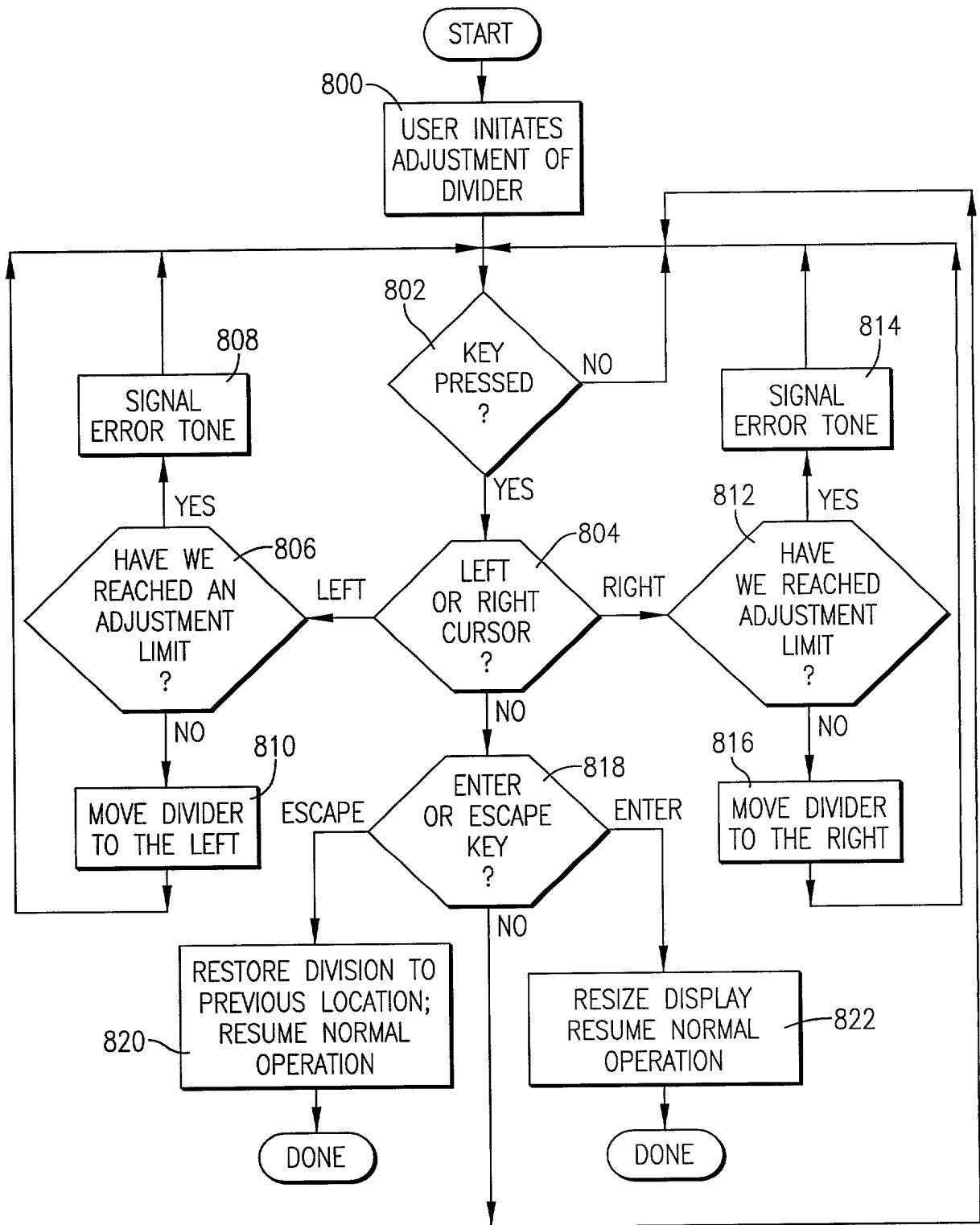


FIG. 8.

As a below named inventor I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name, I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

GPS RECEIVER AND DEPTH SOUNDER UNIT HAVING AN ADJUSTABLE DISPLAY SCREEN

the specification of which: (complete (a), (b) or (c) for type of application)

**REGULAR OR DESIGN APPLICATION**

- (a) ☒ is attached hereto.  
(b) ☐ was filed on as Application Serial No. and was amended on (if applicable).

**PCT FILED APPLICATION ENTERING NATIONAL PHASE**

- (c) ☐ was described and claimed in International Application No. filed and as amended on (if any).

**ACKNOWLEDGMENT OF REVIEW OF PAPERS AND DUTY OF CANDOR**

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56(a).

☒ In compliance with this duty there is attached an information disclosure statement. 37 CFR 1.97.

**PRIORITY CLAIM**

I hereby claim foreign priority benefits under Title 35, United States Code, § 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed: (complete (d) or (e))

- (d) ☒ no such applications have been filed.  
(e) ☐ such applications have been filed as follows

**EARLIEST FOREIGN APPLICATION(S), IF ANY FILED WITHIN 12 MONTHS PRIOR TO SAID APPLICATION**

Country	Application No.	Date of Filing	Date of Issue	Priority Claimed
				<input type="checkbox"/> YES <input type="checkbox"/> NO
				<input type="checkbox"/> YES <input type="checkbox"/> NO
				<input type="checkbox"/> YES <input type="checkbox"/> NO

**ALL FOREIGN APPLICATION(S), IF ANY FILED MORE THAN 12 MONTHS PRIOR TO SAID APPLICATION**


**PROVISIONAL**

I hereby claim the benefit under Title 35, United States Code, § 119(e) of any United States application(s) listed below:

Application Serial No.	Filing Date	Status (patented, pending, abandoned)
------------------------	-------------	---------------------------------------

**CONTINUATION-IN-PART**

(Complete This Part Only If This Is A Continuation-In-Part Application)

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose to the Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56(a), which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application:

Application Serial No.	Filing Date	Status (patented, pending, abandoned)
------------------------	-------------	---------------------------------------

**POWER OF ATTORNEY**

As a named inventor, I hereby appoint the following attorney(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith:

Robert D. Hovey	19,223	Thomas B. Luebbering	37,874
Warren N. Williams	19,156	Andrew G. Colombo	40,565
Stephen D. Timmons	26,513	Tracy L. Bornman	42,347
John M. Collins	26,262	Tracey S. Truitt	43,205
Thomas H. Van Hoozer	32,761		

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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